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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION N
10/602,535	06/23/2003	Mohamed A. Hashish	340058.525	1738

500 7590 11/01/2004

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EXAMINER	
NGUYEN, GEORGE BINH MINH	
ART UNIT	PAPER NUMBER
3723	

DATE MAILED: 11/01/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/602,535	HASHISH ET AL.	
	Examiner	Art Unit	
	George Nguyen	3723	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *02 September 2004*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-75* is/are pending in the application.

4a) Of the above claim(s) *12-75* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-11* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *071904*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Receipt is acknowledged of Applicant's election filed on September 02, 2004.

Claims 12-75 were withdrawn from further consideration.

Claims 1-11 are presented for examination.

This application has been filed with formal drawings which are acceptable to the examiner.

Receipt is acknowledged of the IDS filed on July 19, 2004 which has been considered and placed of record in the file.

Election/Restrictions

1. Applicant's election without traverse of Specie I, subspecies IA, claims 1-11 in the reply filed on September 02, 2004 is acknowledged. Claims 12-75 were withdrawn from further consideration.

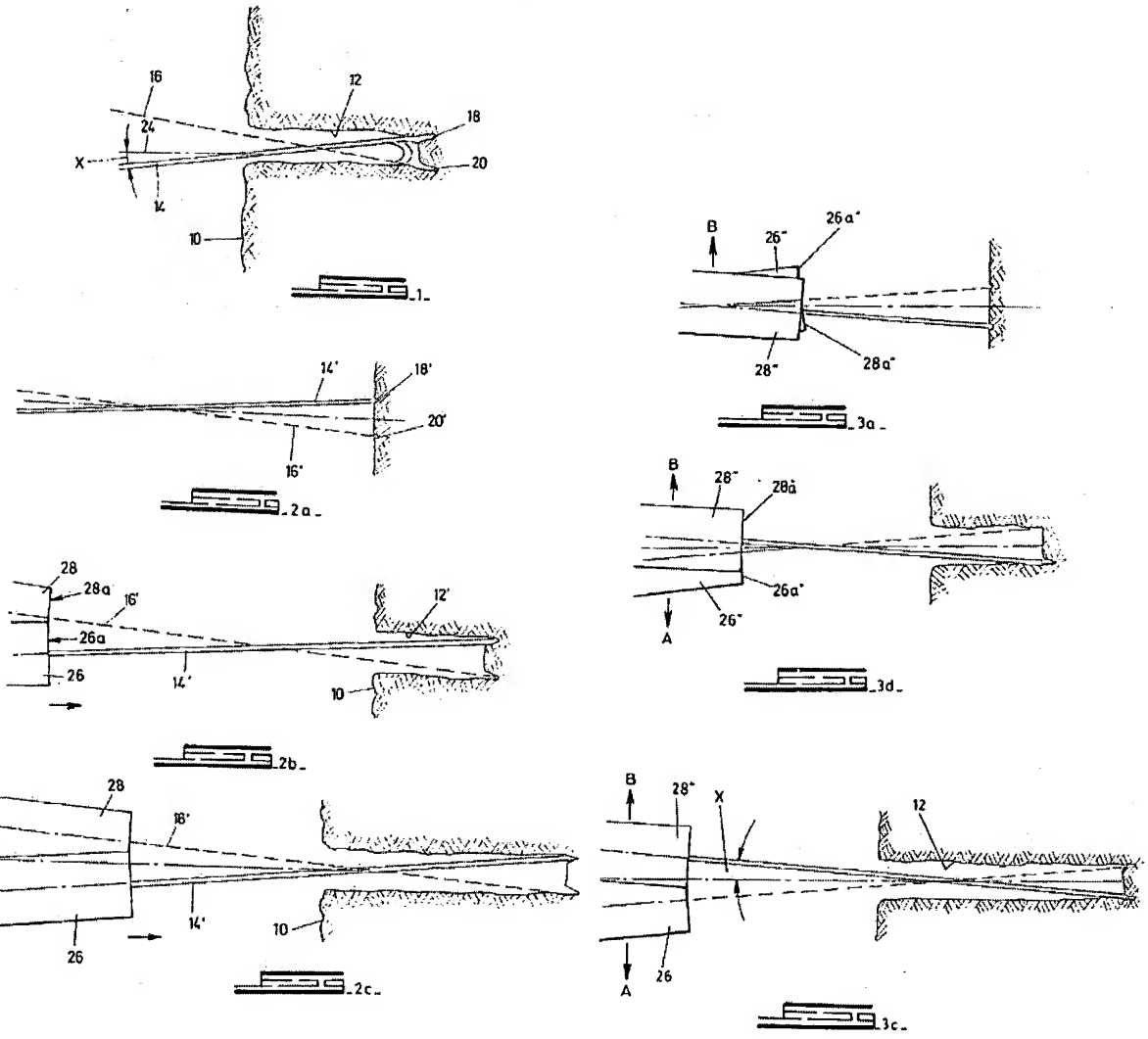
Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

3. Claims 1-11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Noren'3,960,407 in view of Bouten et al.'6,422,920.

With reference to Figures 1-3c, col. 2. line 55 to col. 4. line 25, Noren discloses the claimed method for milling grooves.



(i) General. The locus of the Jets (FIG. 1)

Referring now to FIG. 1, there is shown a rock surface 10 in a slope face. A groove 12 is formed in the rock surface 10. This groove 12 is formed by a pair of jets (the loci of which are indicated respectively at 14 and 16) of water under high pressure. These jets 14 and 16 traverse the rock surface forming slits 18 and 20 in the rock and the material between the slits spalls out to form the groove 12.

It will be noted that each jet extends more or less diagonally across the groove 12, to the corner of the groove at the base, which corner is opposite the side from which the jet enters the groove. Thus, there is virtually no drag on either jet by the side walls of the groove.

The angle between a jet 14 and a line 24 parallel to the centre line of the groove 12 is indicated by X. The angle X is such that at the greatest depth of the groove 12, the jet just misses the front corner of the groove diagonally opposite the slit formed by that jet. The angle X should be as large as possible commensurate with the requirement mentioned in the preceding sentence. It is currently thought than an angle between about five degrees and about ten degrees is a suitable size. The angle X for both jets are preferably the same.

(ii) Fixed Angle Jets from Relatively Fixed Nozzles (FIG. 2)

In FIG. 2 there are shown nozzles 26 and 28 emitting the jets 14' and 16' respectively. The nozzles 26 and 28 are fixed relative to one another. On commencement of the cutting operation (FIG. 2*a*) the end faces 26*a* and 28*a* of the nozzles are far from the rock surface, the slits 18' and 20' are formed and as these slits grow deeper, the rock between them spalls out so that the groove 12' is formed. As the groove 12' becomes deeper, the nozzles 26 and 28 are moved closer to the rock surface 10 (as can be seen from FIGS. 2*b* and 2*c*). This movement can be continuous or can be step-wise, movement taking place after each traverse in one or both directions.

The greatest distance that the nozzles can be from the rock surface to commence the cut is determined by the distance at which the jets disintegrate or break down. For pure water jets this distance is about seventy millimetres. By adding about 0,5% volume/volume of polyoxyethylene to the water, this distance can be considerably increased. The minimum distance of the nozzles from the rock surface is determined by the roughness of the rock surface and the distance allowing for a margin of safety to ensure that the nozzle faces 26*a* and 28*a* will not strike the rock and be damaged thereby. It follows that this arrangement is most satisfactory when the rock surface is very smooth.

It will be understood that the comments made in section (i) above are applicable to this arrangement as indeed they are to all arrangements described herein unless the contrary is clear.

(iii) Fixed Angle Jets from Relatively Movable Nozzles (FIG. 3)

In this arrangement the nozzles 26'' and 28'' are movable relative to one another. This movement is in the direction of the arrows A and B from a position in which the notional continuations of the jets cross behind the nozzle faces 26*a*'' and 28*a*'' (see FIG. 3*a*) to a position in which the loci cross in the groove 12 (see FIG. 3*c*).

With this arrangement, the distance of the nozzles from the rock surface is maintained constant.

(iv) Practical Embodiment to Carry Out Method of FIG. 3 (FIGS. 4 to 7)

a. General

As the apparatus to carry out the arrangement of FIG. 3 is quite complicated, an embodiment thereof will be described. In FIGS. 4 to 6 there are shown the nozzles 26'' and 28''. Each nozzle is connected to an associated intensifier 30 through a conduit system operated by a linkage. The corresponding parts of the conduit systems and the linkages are of identical sizes. For convenience herein the same parts of each conduit system or linkage are allotted the same reference numerals.

b. The conduit systems (general)

The conduit systems each comprise an intensifier 30. The intensifiers 30 are carried on a plate 29 forming part of a head movably carried by a frame indicated at 31. The frame 31 and head are substantially identical to the corresponding parts described and illustrated in the abovementioned Application.

Each conduit system comprises a tube 32 fixed to the intensifier 30, an intermediate tube 34 and an end tube 36 connected to the nozzle. The intermediate tube 34 is connected at its ends to the free ends of tubes 32 and 36 by swivel connections 38 and 40 respectively. The conduit system is described in greater detail in Section (iv) (e) below.

c. The angle setting linkage (FIG. 6)

The angle setting linkage for setting the angles X comprises a pantograph arrangement including levers 42 and 44 joined by a link 46. Lever 44 is located at swivel joint 40 and is fixedly connected to tube 36 to move the latter. Lever 42 is located at swivel joint 38 and is connected to tube 32. This connection is an adjustable connection.

d. The nozzle moving linkage

The nozzle moving linkage for moving the nozzles relative to one another comprises a pair of lever arms 48 connected respectively to the intermediate tubes 34 at the swivel joins 38. The other ends of the lever arms 48 are connected by a member 50 (to be described). The centre part of the member 50 is received within a bearing 52 carried at the end of a push rod 54 which is connected to an hydraulic actuator 56. This actuator 56 is actuable to swing the lever arms 48 thereby to vary the height at which the groove 12 is formed in the rock surface 10.

The central part 60 of the member 50 is tubular. The end parts 62 of the member 50 are also tubular but are of smaller diameter than central part 60 and are arranged with their axes offset from the axis of the central part (as best seen in FIG. 5). The axes of the end parts 62 are diametrically opposite to one another on the central part. These end parts are rotatably received in the ends of the lever arms 48. A quadrant 64 having a toothed arcuate surface (see FIG. 4) is attached to the central part 60 of the member 50. A worm gear 66 driven by an electric or hydraulic stepping motor 68 engages the quadrant 64 to rotate the member 50.

e. The conduit system (in detail) [FIG. 7].

The free end of fixed tube 32 is threaded at 69 to facilitate connection with the intensifier 30, and is recessed at 70 to ensure a fluid tight seal. A radial spigot 72 is formed on the tube 32 and is received in a recess 74 in intermediate tube 34. The spigot 72 had a reduced diameter portion 76 which is located in the recess 74 and is sealed to the recess by a pair of "O"-rings 77 respectively having support rings 78. The end portion 80 of the spigot 72 is stepped down again and is threaded to receive a nut 82 having a locking pin 84. The end of the tube 34 is held between a washer 86 against which the nut 82 bears and a spacer 88 between the tubes 32 and 34.

A cover 90 is secured by screws 92 to the tube 32 opposite to and co-axially with the spigot 72. Below the cover 90 is an annular space in which a ring 94 is received. A screw 96 passes through an arcuate slot 98 in the cover and engages the ring 94. The lever 42 is

However, Noren does not disclose an abrasive fluid jet cutter.

With reference to Figures 1A-1C, Bouten et al. discloses that it is known to have utilized abrasive fluid jet from an angled nozzle to obtain a straight sidewalls and a flat bottoms on a groove.

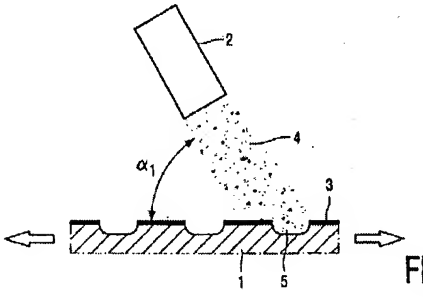


FIG. 1A

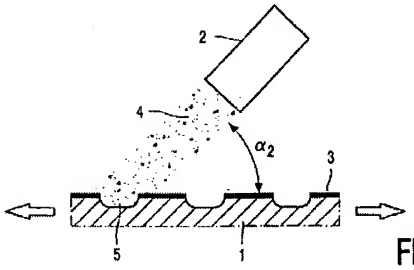


FIG. 1B

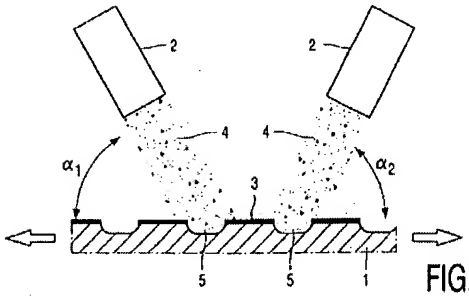


FIG. 1C

FIG. 1 shows diagrammatically the method in accordance with the present invention in the separate sub-FIGS. 1A–1C. The plate or layer of brittle-like material is denoted by reference numeral 1, on which brittle-like material a mask 3 is provided so as to define the region of impact of the abrasive powder particles 4 on the surface of the brittle-like material 1. The jet of abrasive powder particles 4 comes from a nozzle 2 which extends at an angle α_1 to the surface of the plate or layer 1. As a result of the kinetic energy of the jet of abrasive powder particles 4, a pattern of concave spaces or apertures 5 is formed in the brittle-like material 1, while it is also desirable in a special embodiment that a relative movement is performed between the jet of abrasive powder particles 4 and the brittle-like material 1.

FIG. 1B shows the embodiment in which nozzle 2 extends at an angle of angle α_2 to the surface of the plate or layer of brittle-like material 1. The jet of abrasive powder particles 4 is directed onto the surface of the plate or layer of the brittle-like material 1 in such a way that a pattern of concave spaces or apertures 5 is formed in the brittle-like material 1. It should be evident that the nozzle 2 used in FIGS. 1A and 1B may be the same nozzle in a special embodiment so that a pattern of concave spaces or apertures 5 in the brittle-like material 1 is obtained by varying the angles a, and angle α_2. Moreover, it is possible to obtain a pattern of concave spaces or apertures 5 in steps, in which the two jets of abrasive powder particles 4 from nozzle 2 are consecutively directed onto the surface of the plate or layer 1.

FIG. 1C shows diagrammatically the embodiment in which two separate nozzles 2 direct a jet of abrasive powder

Thus, it would have obvious to one having ordinary skill in the art at the time the invention was made to have modified the fluid jet of Noren with an abrasive fluid jet as taught by Bouten in order to further enhance the cutting action to optimize the cutting operation.

Regarding to claims 8-11, it would have been obvious to one having ordinary skill in the art at the time the invention was made to have utilized the range set forth in the claim, since it has been held that discovering an optimum value of a result effective variable involves only routine skill in the art.

Conclusion

4. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Shepherd'921, Liesveld'490, and Bleyer et al.'404 all disclose abrasive fluidjet cutting.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to George Nguyen whose telephone number is 703-308-0163. The examiner can normally be reached on Monday-Friday/630AM-300PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Joseph Hail can be reached on 703-308-2687. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

George Nguyen

GEORGE NGUYEN
PRIMARY EXAMINER

Primary Examiner
Art Unit 3723

GN – October 28, 2004